Science Fiction Security

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Who's Watching Video?

Too much data to be monitored manually

- **Humans cannot effectively watch surveillance video**
- **After 20 minutes, human attention degenerates to an unacceptable level**

"…such a task, even when assigned to a person who is dedicated and well-intentioned, will not support an effective security system."

NIJ Research Report / Sandia National Laboratories

Computer Vision

- Teaching machines to understand what they see…
  - Tough problem
- But, recent advances in technology…
  - Such as the DARPA-sponsored VSAM program (http://www.cs.cmu.edu/~vsam)
- And advances in computer power…
- And increasing integration in security and surveillance infrastructure…
- Intelligent Video is a critical enabling technology for truly scalable, enterprise-wide, security and surveillance

VEW – Event Detection

RULE #1 – Perimeter Warning
"Detect when **<human or vehicle> <crosses> <warning perimeter> <in any direction>**
Respond with a **<log entry>** and a **<tripwire warning sound>** and a **<alert snapshot>**"

RULE #2 – Loitering Warning
"Detect when **<human or vehicle> <enters or loiters in> <embankment area> <where loiter time is 2 mi**
Respond with a **<log entry>** and a **<area warning sound>** and a **<alert snapshot>**"

RULE #3 – Severe Perimeter Alert
"Detect when **<human or vehicle> <crosses> <alert perimeter> <from right to left>**
Respond with a **<log entry>** and a **<tripwire alert sound>** and a **<alert snapshot>** and
a **<e-mail to the security director>** and a **<PDA message to the security patrol>** and […]"

PERIMETER WARNING

LOITERING WARNING

PERIMETER ALERT

Alerts include all necessary information - when the event occurred, where the event occurred, what rule was violated, and which object and type of object violated the rule

Some Applications of VEW

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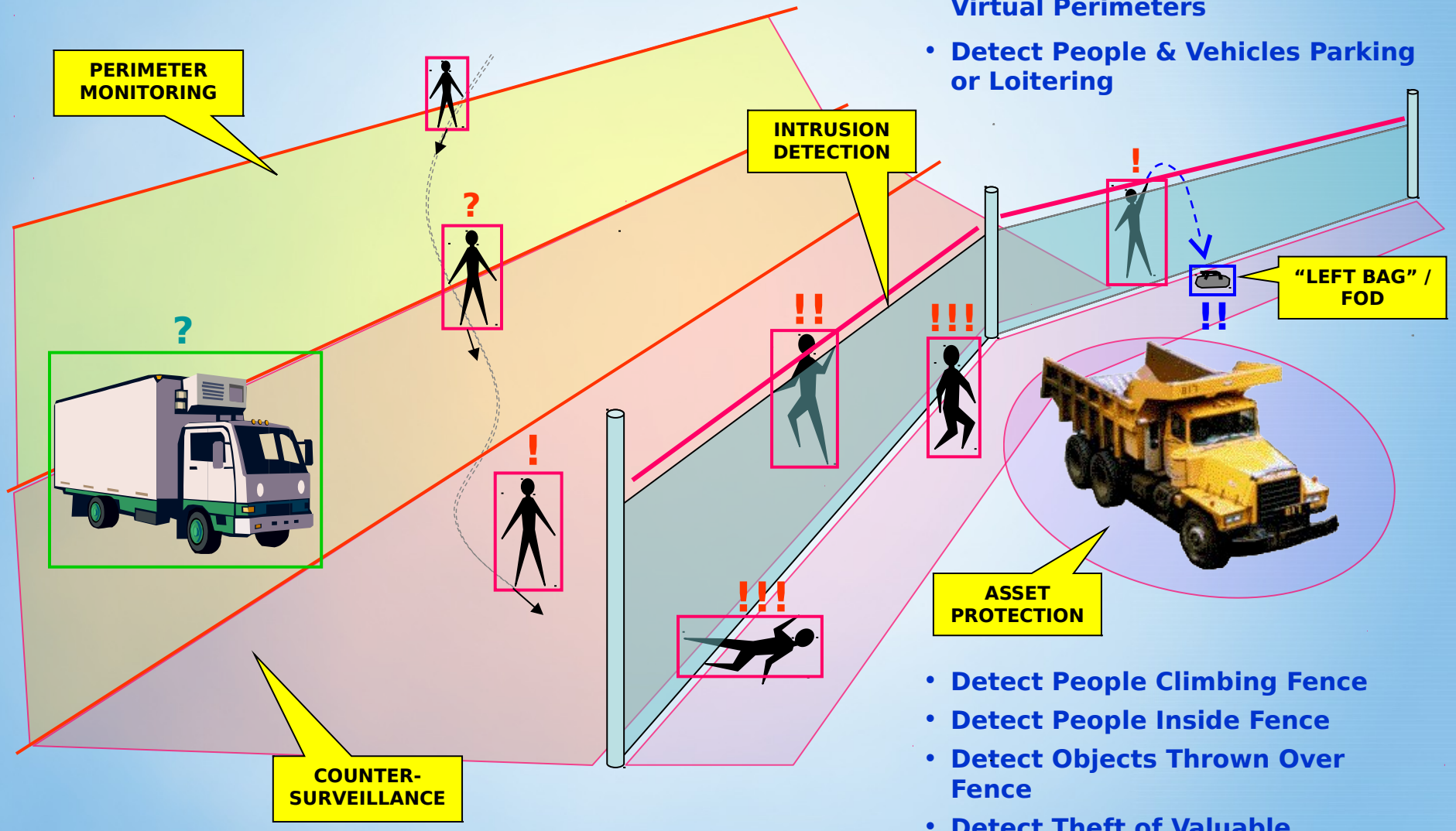
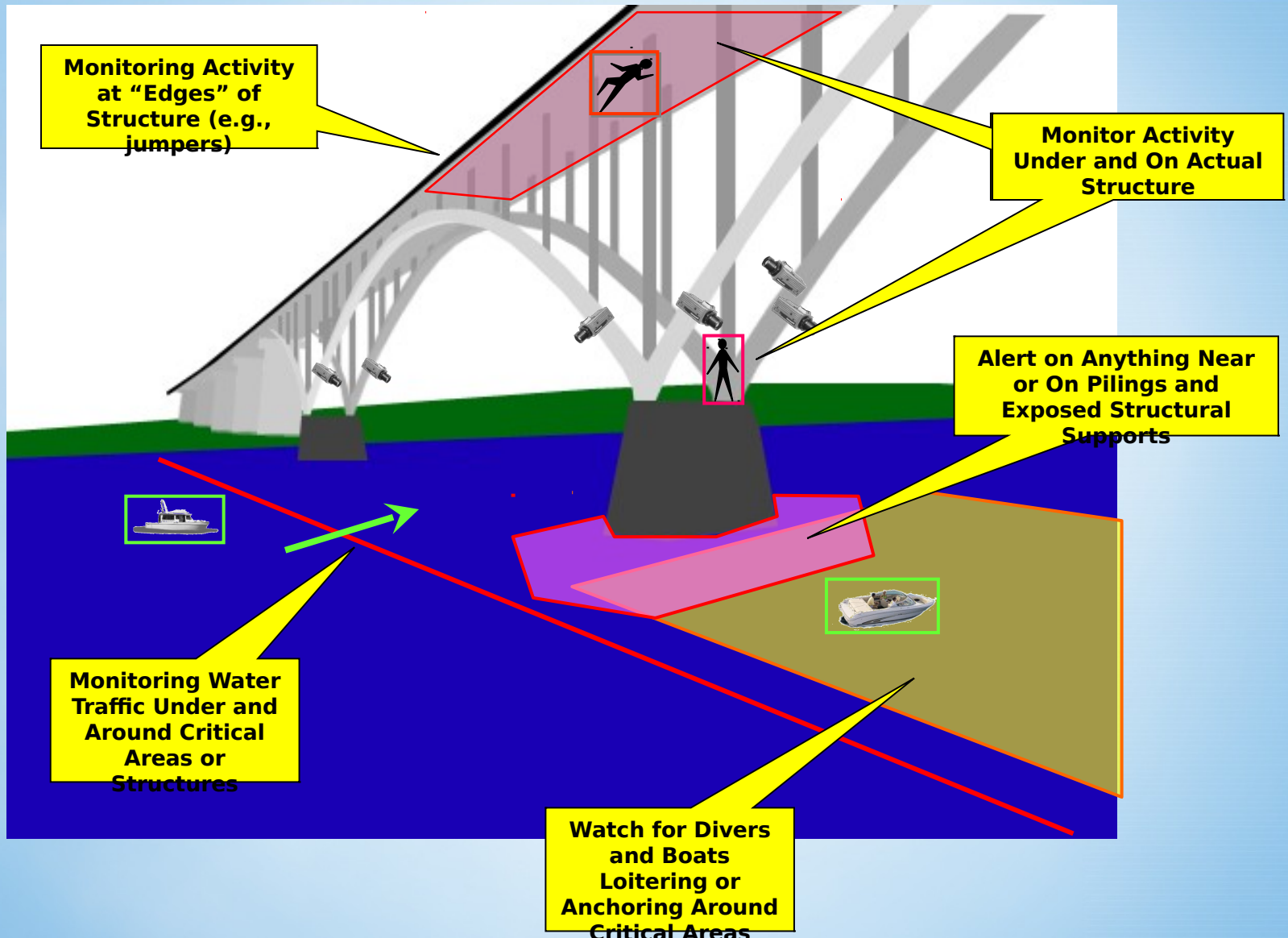
- Detect & Alert on Multiple Zones
- Detect People & Vehicles Crossing Virtual Perimeters
- Detect People & Vehicles Parking or Loitering



- Detect People Climbing Fence
- Detect People Inside Fence
- Detect Objects Thrown Over Fence
- Detect Theft of Valuable Assets

Some More Applications of VEW


Monitoring Activity at “Edges” of Structure (e.g., jumpers)
Monitor Activity Under and On Actual Structure
Alert on Anything Near or On Pilings and Exposed Structural Supports
Monitoring Water Traffic Under and Around Critical Areas or Structures
Watch for Divers and Boats Loitering or Anchoring Around Critical Areas

In the Real World

Perimeter Incursion Detection

More in the Real World

Left Object

Theft

Even More in the Real World

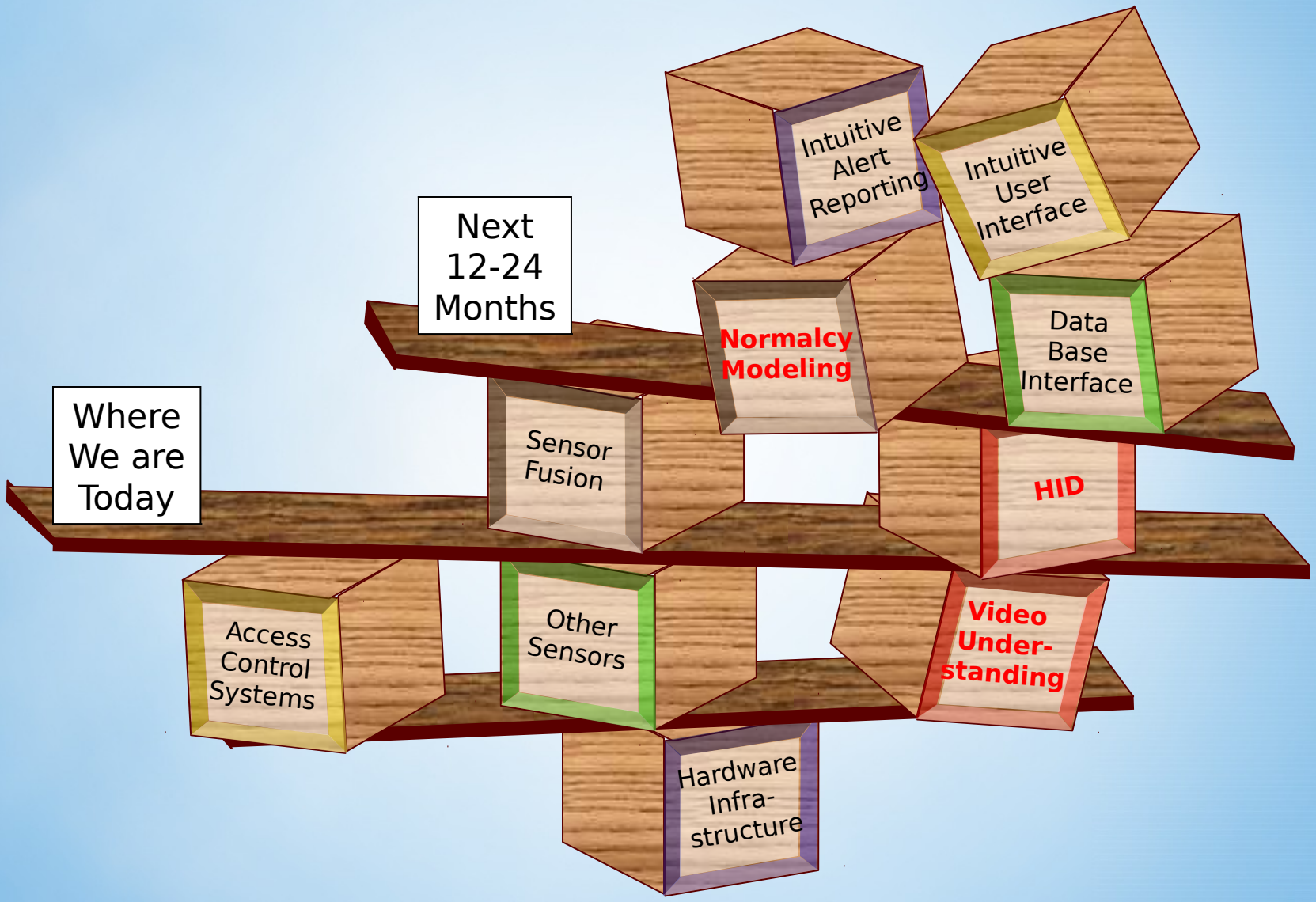
Wrong-Way Traffic Flow Detection

Coming Down the Pike

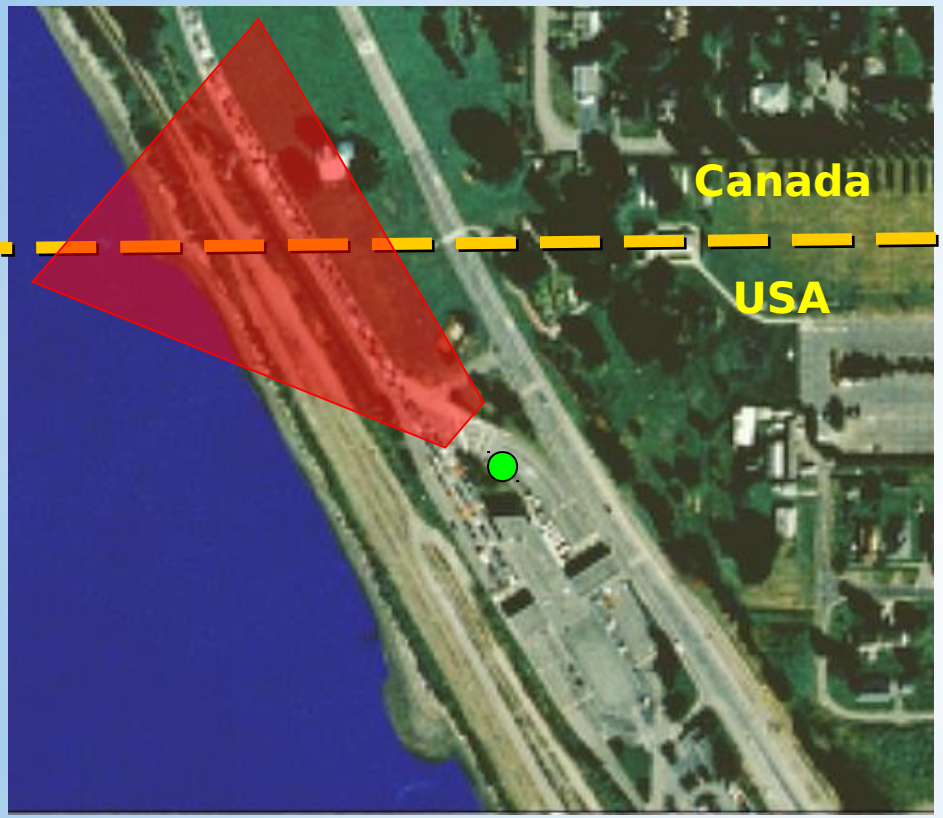
Australian: therefore suspicious!!

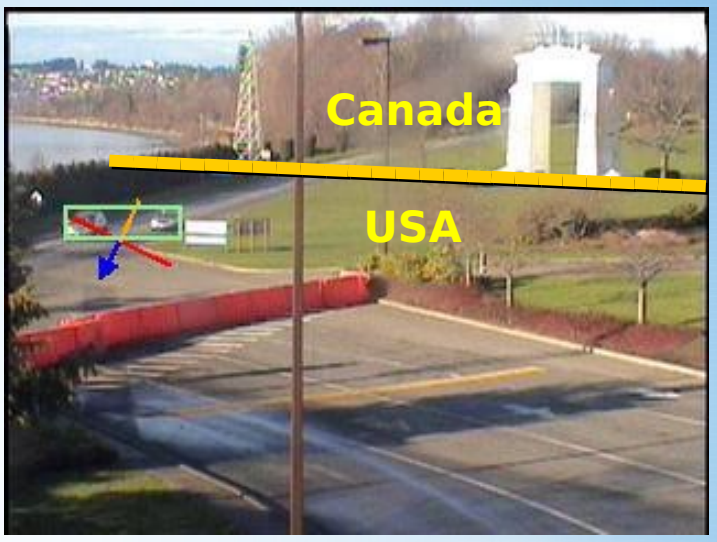
Bio-Metrics of non-cooperative subjects – by Face or Gait

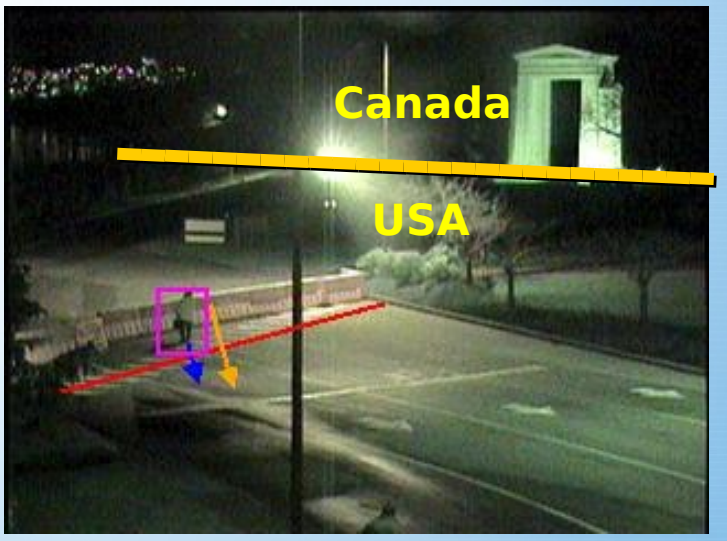
Enabling Technology BlockPile



Example – US Customs Northern Border Protection

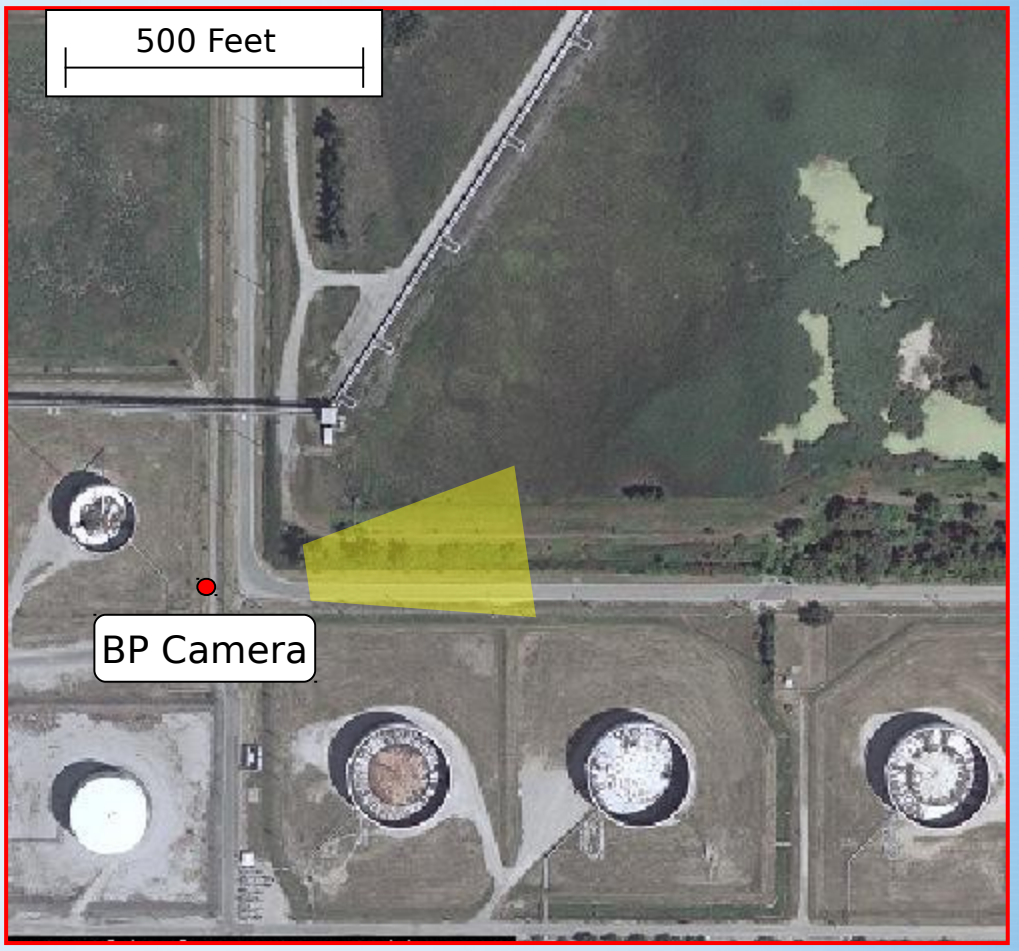






VEW Detecting human and vehicle activities by day or night

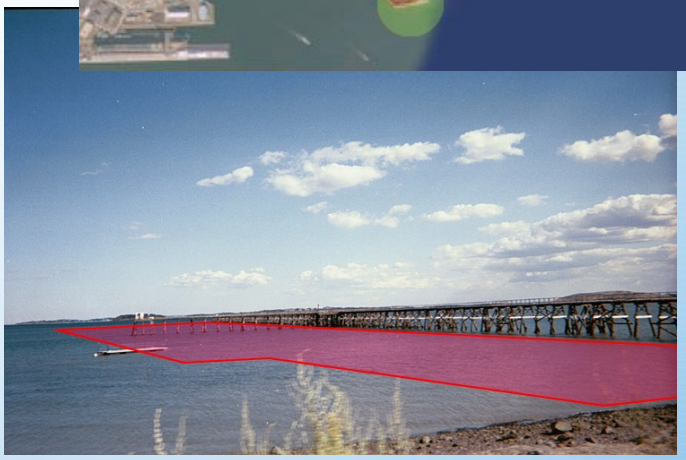
Example: An Oil Refinery



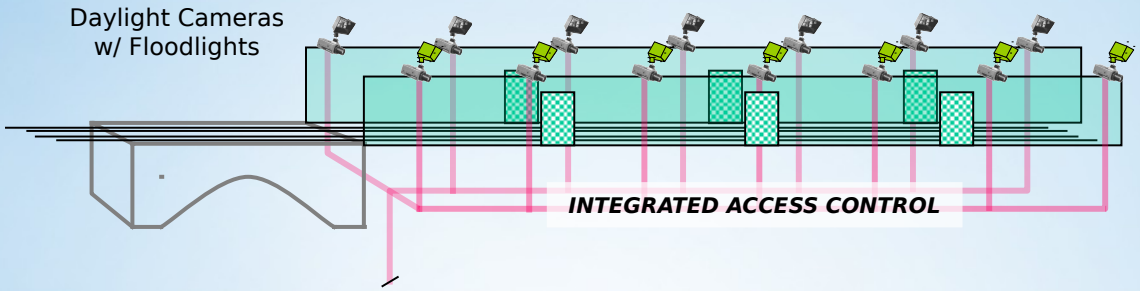
- Protection for 5 mile perimeter
- Perimeter testing using customer-chosen camera.
- Usability testing with actual security personnel.
- Day and night scenarios.

Example: Logan Airport

- Complete airfield perimeter protection – 8 miles.
- Day and night protection required.
- Additional protection in critical zones and for weather.
- Massport and Massachusetts State Police Marine Division participating in testing.



Example: Hackensack Bridge



- Commuter rail bridge monitoring.
- Rail yard train car protection.
- System to cover ~600 cameras.

Conclusion

- Current approach to security is not scalable
  - More people, more cameras, more confusion
- Automation is key
- Intelligent Video is a solution for automating intuitive video surveillance tasks
- Buy our product ☺

How important is what you're *not* seeing?
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